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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/578,286	05/04/2006	Steven T. Peake	GB03 0199 US1	1832
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NXP, B.V. NXP INTELLECTUAL PROPERTY & LICENSING M/S41-SJ 1109 MCKAY DRIVE SAN JOSE, CA 95131				
EXAMINER				
GREEN, TELY D				
ART UNIT		PAPER NUMBER		
2822				
NOTIFICATION DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

Office Action Summary

Application No.

10/578,286

Applicant(s)

PEAKE, STEVEN T.

Examiner

TELLY D. GREEN

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 March 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

This office action is in response to the filing of the Applicant's Amendment on March 24, 2009.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1, 4-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA (Applicants Admitted Prior Art) in view of Wolfgang et al. (Wolfgang) (DE **10001415 A1**) in view of Hirler et al. (Hirler) (**US Patent 6,498,382 B2**).

In regards to **claims 1, and 4-8**, AAPA (**Fig. 1**) discloses a semiconductor body defining opposed first and second major surfaces (**uppermost surface of structure in Fig. 1, bottom most surface of item 12**); a drain region of a first conductivity type (**items 2 plus 4, n-type**) extending vertically between the second major surface and part of the first major surface; a body region (**item 6, p-type**) of a second conductivity type opposite to the first conductivity type extending from the first major surface to a body depth; a source region (**item 8**) of the first conductivity type adjacent to the body region at the first major surface; a source contact (**item 10**) contacting the source region and a drain contact (**item 12**) contacting the drain region(**item 4**), and an insulated gate (**item 14**) extending laterally over the first major surface over the body region, defining a channel region (**not labeled, but is the region between item 8 and items 2 plus 4**) extending in the body region from a source end adjacent to the source region to a drain

end adjacent to channel end part of the drain region, but does not specifically disclose further comprising: a conductive shield plate for shielding the gate, extending in an insulated trench from the first major surface towards the second major surface, the conductive shield plate being separated from the body region by part of the drain region including the channel end part of the drain region and the conductive shield plate being electrically connected to the source region , a conductive shield plate extension connected to the shield plate extending laterally over the first major surface of the drain region from the shield plate towards the channel end part of the drain region, the shield plate extension being separated by insulator from the drain region, wherein the shield plate trench extends to a depth that is substantially equal to the body depth, wherein the gate extends over the channel end part of the drift region by no more than about 0.4 microns, wherein the depth of the shield plate trench is between about 50% and about 200% of the depth of the body region.

Wolfgang (**Fig. 1 3**) discloses a conductive shield plate (**items 90a, 90b**) for shielding the gate, extending in an insulated trench (**items 70a plus 80a, 70b plus 80b**) from the first major surface towards the second major surface, the conductive shield plate being separated from the body region by part of the drain region including the channel end part of the drain region and the conductive shield plate being electrically connected to the source region, wherein the shield plate trench extends to a depth that is substantially equal to the body depth

Hirler (**Figs. 2 and 3**) discloses a conductive shield plate extension (**lateral portions of item 6 overlying items 4 and 7 in the horizontal direction**) connected to the shield plate extending laterally over the first major surface, the shield plate extension being separated by insulator (**item 7**) from the drain region,.

Therefore it would have been obvious to one of ordinary skill at the time of the invention to combine the teachings above for the purpose of permittivity, reduction of on resistance and reduced length in drift path.

However, the applicant has not established the critical nature of the lateral gap between the shield plate extension and the gate being in the range of about 0.05 to about 0.2 microns; wherein the lateral gap between the shield plate trench and the body region being between about 0.5 and about 2 microns, the gate extending over the channel end part of the drift region by no more than about 0.4 microns ($x \leq 0.4$) or the depth of the shield plate trench is between about 50% and about 200% of the depth of the body region. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). To establish unexpected results over a claimed range, applicants should compare a sufficient number of tests inside and outside the claimed range to show criticality of the claimed range. In re Hill, 284 F.2d 955, 128 USPQ 197(CCPA 1960). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have various ranges.

3. **Claims 9-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA (Applicants Admitted Prior Art) in view of Wolfgang et al. (Wolfgang) (**DE 10001415 A1**) in view of Hirler et al. (Hirler) (**US Patent 6,498,382 B2**) as applied to claims 1 and 5-8 above and further in view of Baliga (**US 2002/0177277 A1**).

In regards to claims 9-14, AAPA (Fig. 1) discloses a semiconductor body defining opposed first and second major surfaces (**uppermost surface of structure in Fig. 1, bottom most surface of item 12**); a drain region of a first conductivity type (**items 2 plus 4, n-type**) extending vertically between the second major surface and part of the first major surface; a body region (**item 6, p-type**) of a second conductivity type opposite to the first conductivity type extending from the first major surface to a body depth; a source region (**item 8**) of the first conductivity type adjacent to the body region at the first major surface; a source contact (**item 10**) contacting the source region and a drain contact (**item 12**) contacting the drain region(**item 4**), and an insulated gate (**item 14**) extending laterally over the first major surface over the body region, defining a channel region (**not labeled, but is the region between item 8 and items 2 plus 4**) extending in the body region from a source end adjacent to the source region to a drain end adjacent to channel end part of the drain region, but does not specifically disclose further comprising: a conductive shield plate for shielding the gate, extending in an insulated trench from the first major surface towards the second major surface, the conductive shield plate being separated from the body region by part of the drain region including the channel end part of the drain region and the conductive shield plate being electrically connected to the source region , a conductive shield plate extension connected to the shield plate extending laterally over the first major surface of the drain region from the shield plate towards the channel end part of the drain region, the shield plate extension being separated by insulator from the drain region, wherein the shield plate trench extends to a depth that is substantially equal to the body depth, wherein the gate extends over the channel end part of the drift region by no more than about 0.4 microns,

wherein the depth of the shield plate trench is between about 50% and about 200% of the depth of the body region.

Wolfgang (**Fig. 1 3**) discloses a conductive shield plate (**items 90a, 90b**) for shielding the gate, extending in an insulated trench (**items 70a plus 80a, 70b plus 80b**) from the first major surface towards the second major surface, the conductive shield plate being separated from the body region by part of the drain region including the channel end part of the drain region and the conductive shield plate being electrically connected to the source region, wherein the shield plate trench extends to a depth that is substantially equal to the body depth.

Hirler (**Figs. 2 and 3**) discloses a conductive shield plate extension (**lateral portions of item 6 overlying items 4 and 7 in the horizontal direction**) connected to the shield plate extending laterally over the first major surface, the shield plate extension being separated by insulator (**item 7**) from the drain region.

Baliga (**paragraphs 47, 56**) disclose wherein the gate (**item 118**) extends over the channel end part of the drift region (**item 100**) by no more than about 0.4 microns.

Therefore it would have been obvious to one of ordinary skill at the time of the invention to combine the teachings above for the purpose of permittivity, reduction of on resistance and reduced length in drift path..

AAPA as modified by Hirler, Wolfgang and Baliga does not specifically disclose wherein wherein the depth of the shield plate trench is between about 50% and about 200% of the depth of the body region.

However, the applicant has not established the critical nature the gate extending over the channel end part of the drift region by no more than about 0.4 microns ($x \leq 0.4$) or the depth of the shield plate trench is between about 50% and about 200% of the depth of the body region. “The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.” In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). To establish unexpected results over a claimed range, applicants should compare a sufficient number of tests inside and outside the claimed range to show criticality of the claimed range. In re Hill, 284 F.2d 955, 128 USPQ 197(CCPA 1960). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have various ranges.

4. **Claim 3** are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA (Applicants Admitted Prior Art) in view of Wolfgang et al. (Wolfgang) (**DE 10001415 A1**) in view of Hirler et al. (Hirler) (**US Patent 6,498,382 B2**) as applied to claim 1 above, and further in view of Tihanyi (**US Patent 5,973,360**).

In regards to claim 3, AAPA as modified by Hirler disclose all of the limitations above except a gate insulator layer extends under both the gate and the shield plate extension.

Tihanyi (**Fig. 1**) discloses a gate insulator layer (**item 5**) extends under both the gate (**item 6**) and the shield plate extension (**item 7**).

Therefore it would have been obvious to one of ordinary skill at the time of the invention to combine the teachings above for the purpose of isolation from the drift region.

Response to Arguments

Applicant's arguments with respect to claims 1 and 3-14 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TELLY D. GREEN whose telephone number is (571)270-3204. The examiner can normally be reached on Monday thru Friday 7:30 AM - 5:00 PM EST..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Zandra V. Smith/
Supervisory Patent Examiner, Art
Unit 2822

/Telly D Green/
Examiner, Art Unit 2822
June 3, 2009